RAMDOS

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DISC DRIVE SOFTWARE
FOR THE CPC464, 664 & 6128

CPC 5 1/4" SECOND DISC DRIVES — Fitting Instructions

General Note

Please ensure that the computer and all relating hardware are disconnected from the mains supply before connecting or removing the disc drive.

The mains cable for the second drive should be fitted with a 2 Amp fuse, with the brown wire to live and the blue wire to neutral.

CPC 464

On the cable between the Amstrad 3" drive and the DD1 disc interface is a black 34 way socket. The 34 way plug coming from the second drive should be fitted to this socket, whilst ensuring that the "lip" on the outside of the socket is lined up with the slot in the plug.

CPC 664/6128

On the rear of the keyboard there is a 34 way edgecard connector with "DISC DRIVE 2" marked above it. The second drive cable is fitted with a key-way so that it can only be connected one way round; i.e. with the ribbon cable exiting downwards from the socket.

Important

Once the above instructions have been completed, the second drive is ready for use.
The drive should be switched on before the computer. Please ensure that a 5 1/4" disc is inserted and the door or lever is shut BEFORE the B drive is accessed from Amsdos or C/PM.

N.B. We recommend that 96 t.p.i (80 track, double sided, double density) discs are used. Please also note that we cannot guarantee the operation of some coloured discs due to the method employed by the drive to determine whether a disc has been inserted.

YOUR RAMDOS SOFTWARE

This may be supplied on 3ins or 5.1/4 ins discs.
If it is on 5.1/4 then carry out the following to transfer to it to 3ins. With the new disc drive connected as above.
Format a new 3ins disc in drive A in the usual way then from within CPM use PIP program to copy the 5.1/4ins disc in drive B to the 3ins disc in drive A. As below.

```
A>PIP                [Enter]       (Place new 3ins in drive A, and RAMDOS
  ---                -------       5.1/4 disc in drive B then enter.)
*A:=B:*.*            [enter]
 ---------           -------
```

Please note the software supplied on 5.1/4ins disc is on a 40 track single sided type system, the same as drive A, this is the default for drive B if NO software such as RAMDOS is installed, once RAMDOS is installed the drive B is set up for 80 track double sided, hence you are now unable to read the RAMDOS disc as supplied on 5.1/4ins. If you wish to make further copies of this master disc then follow as above without RAMDOS installed.

RAMDOS

RAMDOS allows the use of an 80 track double sided second disc drive on the Amstrad CPC series of computers under Amsdos (Amstrad Basic), CP/M 2.2 or CP/M Plus.

Most of the programs are unprotected so that they cant be copied onto your discs easily. However, you may not pass copies to another individual or company. The programs are encoded so that any illegal copies can be traced to their original owner.

The various programs on the disc allow the use of RAMDOS in the different programming environments and other situations:

```
RAMDOS.BAS & RAMDOS.BIN      - for use in Basic (Amsdos)
RAMDOS2.COM                  - for use in CP/M 2.2
RAMDOS+.COM                  - for use in CP/M plus
FORMATS.BIN                  - to format discs etc
RAMDOST.BAS                  - to use with TASWORD 6128
```

RAMDOS with Basic or Binary Programs:

Switch on Drive B, THEN switch on the computer and type:

```
RUN "RAMDOS" [ENTER]
```

RAMDOS prompts you state the computer you are using and loads RAMDOS.BIN accordingly. If the computer is a unexpanded 464 or 664, HIMEM is lowered by about 2k, but if it has the extra 64k of memory, HIMEM is not changed. Discs for drive B can be formatted using FORMATS (see below).

The disc command and BIOS calls work as normal with RAMDOS (ie SAVE, LOAD, |ERA, |REN, |TAPE, |DISC, CALL &BC77 etc etc).

Start of day disc:

Files needed are: RAMDOS.BAS and RAMDOS.BIN. The Basic program is unprotected, and can be loaded and saved as normal. The Binary program can be loaded by:

```
MEMORY &2FFF:LOAD "RAMDOS.BIN",&3000
```

and saved by:

```
SAVE "RAMDOS.BIN",b,&3000,&E00
```

Technical details:

RAMDOS.BIN occupies about &900 bytes, the bulk of which (about &800) can be relocated to any address between &4000 and &BFFF or in any of the extra banks of memory (ie banks 4-7), and a small portion of which (about &C0) must reside in &8000- &BFFF. It is relocated by loading into &3000 then calling &3000 with the following parameters:

```
CALL &3000, @mh% [,bank,@hm.bank%]
```

The portion in square brackets is optional and is used to relocate the larger part of the program into one of the extra banks of memory. If it is ommited, the larger part of the program will be relocated immediately below the smaller part. The variables hm% and hm.bank% are the addresses below which the program will be relocated, and must be defined before they are used. After relocation they are automatically updated to the address immediately below the relocated program.

Examples of alternative loading programs:

```
10 ' to relocate RAMDOS.BIN below HIMEM
20 IF HIMEM>&7FFF THEN hm%=HIMEM-2*-&8000 ELSE HM%=HIMEM
30 MEMORY &2FFF: LOAD "RAMDOS.BIN", &3000
40 CALL &3000, @hm%
50 MEMORY hm%
```

```
10 ' to relocate RAMDOS.BIN to bank 7 and below HIMEM
20 IF HIMEM>&7FFF THEN hm%=HIMEM-2*-&8000 ELSE HM%=HIMEM
30 bank%=7
40 hm.bank%=&7FFF: REM address in bank 7
60 MEMORY &2FFF: LOAD "RAMDOS.BIN", &3000
70 CALL &3000, @hm%, bank%, @hm.bank%
80 MEMORY hm%
```

The loading program RAMDOS.BAS relocates RAMDOS.BIN to just below HIMEM or, if extra banks are available, to the top of bank 7 and to the area of memory used by Tone Envelopes nos. 3-15. If you wish to use these Tone Envelopes, then either relocate the whole of RAMDOS.BIN below HIMEM in the normal RAM or relocate the second part into a different area. The first option is the easier, because you just need to tell RAMDOS.BAS that you are using an unexpanded 464 or 664. The second option requires that you write an alternative loading program such as no.s 2 or 3 above.

The bank number at which the majority of the program is held is found at &BE3F, in the form of &C0 + bank number. In the ROM version this is the ROM position, and in RAMDOS2 this has a value of 2.

If RAMDOS is relocated into one of the extra banks of memory, the 2K buffer used by CAT and LOAD is fixed immediately below RAMDOS, occupying roughly &7000- &7800. This buffer normally resides immediately below HIMEM, but this means that the buffer would be in danger of over- writing RAMDOS. This is because the bank used by RAMDOS is switched in to occupy &4000- &7FFF whenever disc functions are used, so that the 2k buffer over- writes this bank whenever HIMEM is between &4800- &8800. To avoid this, the buffer is fixed to a permanent position occupying the 2k immediately below RAMDOS.

The position of this permanent buffer address can be changed by poking a new value into &BE3D/C after RAMDOS has been initialised. A value of zero will make the buffer lie immediately below HIMEM as normal.

FORMATS.BIN

Install RAMDOS then:

```
RUN "FORMATS"
```

FORMATS invites you to:

1. View or Change format of a drive
2. Format a disc
3. Customise RAMDOS.BIN
4. Examine the Disc Parameter Blocks
5. Change the Disc Parameter Blocks
6. Catalogue disc
7. Change USER number
8. Disc Copy
9. Test format of Drive B

1. Change formats

This allows the computer to be set to read and write different disc formats. Before formatting a disc, you will need to use this function to set the drive to the format which you wish to have.

The formats available for drive B are:

```
D1     Data     disc with 128 directory entries, 716K
D10    Data     disc with 128 directory entries, 796K
D2     Data     disc with 256 directory entries, 712K
D20    Data     disc with 256 directory entries, 792K
O      Other formats
```

The formats for drive A are:

```
D      Data     disc with 64  directory entries, 178K
S      System   disc with 64  directory entries, 169K
P      PCW      disc with 64  directory entries, 173K
B      Buffer   disc used for copying a 5.25" drive
O      Other formats
```

The formats D10 and D20 hold more data because they use 10 sectors per track, but this may not be compatible with other computers.

It is better to chose one format to start with, and format all your discs the same. The default format is D20. The default in RAMDOS.BIN can be changed by function 3. To use different formats with the CP/M versions see the relevant notes below.

The Buffer format is needed for function 8 (see below). The "Other" option allows you to define your own format, within sensible limits.

2. Format a disc

The disc will be formatted according to the current format set for that drive. You are reminded of the current formats and asked which drive you wish to use for formatting. If the current format is not the format you wish to put on the disc, then press N (for None), which will return you to the menu, and use function 1 to change the current format.

Error messages such as "Disc not Ready" may occur on Drive B, because it takes a little time for the head to move from track 80 to track 0. If this occurs, press 'R' (for Retry) to continue formatting. An error message referring to 'Drive F' means Drive B, side 2.

3. Customize RAMDOS.BIN:

This allows you to change the default format used by RAMDOS for drive B. It loads RAMDOS.BIN, alters the Disc Parameter Block with the values of the current format for drive B, and then saves this new version.

4 & 5. Examine & Change the Disc Parameter Block:

These functions are for the specialist. The DPB values represent the current formats which are set for the drives. They are recalculated and updated when function 1 is used to change the format, but function 5 allows you to set these values independently.

WARNING. Setting these values wrongly can seriously damage the health of your disc drive.

6 & 7. CATalogue and change USER:

Either disc can be catalogued. The default USER number is 0, and this USER is catalogued unless a change is requested.

8. Disc Copy:

This function is for copying a disc in drive B. In order to cut down the number of disc swaps to a minimum, a Buffer disc is used in drive A which can hold one quarter of the data on a 5.25" disc. The destination disc must have the same format as the source disc BEFORE copying, and the disc in drive A must have the 'Buffer' format.

9. Test Disc format:

This function will identify the format of any disc which has been formatted using FORMATS. The first track is searched for all the sector numbers present, and the first five track numbers on each side are identified. The information enable most non-standard formats to be identified.

Technical details:

The Disc Parameter Blocks (DPBs) of both drives the Allocation Vector of drive A (ALVa – a representation of disc usage and the Check Sum of drive A (CKs - a representation of directory usage) remain at their normal addresses but the ALVb is located at &BE00 and the CKsb at &BEC0. These CKSs and ALVs allows for a maximum of 184k and 64 directory entries in drive A, and 800K and 256 directory entries in drive B. If larger values are required then the CKS or ALV concerned will have to be moved.

The different formats are recognised by their sector numbers. The standard formats for drive A use the same sector numbers as normal. The first sector number of the different formats are:

```
Drive A:      S = &41                Drive B:      D1  = &01
              D = &C1                              D10 = &11
              B = &11                              D2  = &21
              P = &01                              D20 = &31
              O = &81                              O   = &81
```

Double sided discs are assumed to be single step and flip-sided, but the sidedness and stepping can be changed by function 1, requesting the "Other" format types.

Sidedness of three kinds are recognised:

- Flip sides: Logical tracks 0-159 on alternate sides of the disc, from physical track 0-79.
- Up and Over A: Logical tracks 0-79 on side 0 of the disc, and logical tracks 80-159 on side 1.
- Up and Over B: this is the reverse of normal Up and Over on the second side, so that both sides are identical.

The table below may (or may not) make this clearer. If in doubt, use Flip sides, which is the fastest and commonest format. If you are trying to read a strange disc and Flip sides produces nonsense, then try Up and Over A, which is much more command than B.

Sidedness	Logical Track No.	Physical Track No.	Side
Flip Sides	0	0	0
	1	0	1
	2	1	0
	3	1	1
	159	80	1
Up and Over A	0	0	0
	1	1	0
	79	79	0
	80	79	1
	159	0	1
Up and Over B	0	0	0
	79	79	0
	80	0	1
	159	79	1

Sidedness and stepping are recorded at &BE3A and &BE3D for drive A & B respectively. They are set to the default values of 0 and &8F on initialisation and can be changed by poking new values. The byte value is worked out as follows (where "x" is any bit value):

```
&Fx = 40 tracks single stepping
&8x = 80 tracks single stepping
&4x = 40 tracks double stepping
&xF = Double sided Flip sided
&x8 = Double sided Up and Over A
&x4 = Double sided Up and Over B
&x2 = Single sided.
```

One powerful facility of RAMDOS is the ability to read or format tracks whose logical track numbers are different from their physical track numbers. This allows the reading of many protected discs (where tracks numbers have been altered to prevent copying) and non - CPC discs where the normal format uses an offset in the track numbers (e.g. PC discs). It also allows the creation of protected discs. The physical track number is position of the track on the disc (0- 39 or 0- 79), and the logical track number is the number encoded into the sectors when formatting. The offset is the difference between them. This offset must be poked into &BE39 for drive A and &BE3D for drive B. The default value is zero, which allows the reading of all normal Amstrad formats.

It should be noted that a disc in drive A with the Buffer format has 200K, but if the whole of this space is to be used, the ALVa should be moved, because it will be too large and will overwrite the DPBb if the Buffer disc is CATed, LOADed to or SAVEd from. A new ALVa at (for example) &BE80 could be set by poking the address into &A91E/F.

Please take note:

When using 256 directory entries, it is recommended that two or more different user numbers are used, with up to 128 directory entries in each.
The use of 256 entries in any one user group can cause corruption after approximately 140 entries.
This is due to the fact that the disc buffer is 2k long and it takes a certain amount of memory for the entries to be sorted. When this buffer is filled and more entries are added, memory outside this area is overwritten, causing corruption and malfunction of the program. This could be cured by making the buffer larger but this could cause compatibility problems with other software.
So if the above rule is adhered to you can use 256 entries on a disc (the use of user groups does also make it possible to partition the disc and make its use easier).

RAMDOS with CP/M 2.2

Before you can use RAMDOS with CP/M 2.2 you will need to modify your system discs (see Start of Day Disc below). Modified discs can be used as normal, with or without RAMDOS, but the TPA will be reduced to 42K.

Discs for drive B can be formatted by using FORMATS (see above). The default format is D20 but any of the standard formats can be read.

When you have modified your discs for drive A and have formatted some discs for drive B, RAMDOS Is Installed by:

```
|CPM    [Enter]
RAMDOS2 [Enter]
```

Or, If you wish to use another format, eg D10, type:

```
RAMDOS2 D10
```

Some CP/M 2.2 programs cannot be used with an 80 track second drive, either because they are written for drive A only (such as FILECOPY, DISCCOPY, DISCCHK) or because they assume that drive B has the same format as drive A (such as COPYDISC, CHKDISC, FORMAT).

To move files, use PIP (see your Amstrad manual), eg to copy all the contents of drive A to drive B use: `PIP B:=A:*.*`

Start of day disc:

To modify the system tracks:

```
Put the CP/M 2.2 System Disc In drive A. with Side 1 uppermost
Type:   |CPM
        MOVCPM 170 *
        SYSGEN *
Put the disc to be modified In drive A when prompted. Press any key.
```

To copy RAMDOS2.COM onto a Start of Day disc:

```
Put the CP/M 2.2 System Disc in drive A. with Side 1 uppermost
Type:   |CPM                  [Enter]
        FILECOPY RAMDOS2.COM  [Enter]
Put the RAMDOS disc In drive A when prompted for the Source Disc.
Put Start of Day disc in drive A when prompted for Destination Disc.
```

Follow the same procedure to copy PIP.COM (on the Utilities disc).

SETUP can be used to call RAMDOS2 automatically whenever |CPM Is used (see Amstrad manual). Add into the Initial Command buffer: `RAMDOS2^M`
A different default format can be Installed by adding the new format to the Initial Command buffer, eg: `RAMDOS2 D10^M`

Technical details:

MOVCPM moves the CCP down In memory to make room for RAMDOS. The main jumpblock Is moved from &AD00 to &A400.

The addresses for the CKS and ALV of drive B, the sidedness and track offset of both drives are the same as for RAMDOS.BAS.

RAMDOS with CP/M Plus:

```
Put any disc In drive B
Type '|CPM' and press Enter
Type 'RAMDOS+ D20' and press Enter.
```

If a disc is not In drive B when CP/M Plus is loaded, then drive B will not be logged in.

The discs for drive B can be formatted by using FORMATS (see above). DISCKIT3 cannot be used to format a double sided 80 track disc. The standard four formats (D1, D10, D2, D20) can be called directly by typing 'RAMDOS+ D10' or RAMDOS+ D2' etc. If RAMDOS+ Is entered without a format, you will be prompted for one of these formats or for "Other" formats. The "Other" option enables you to change the Disc Parameter Blocks directly (see Technical Details below).

Start of day disc

File needed is: RAMDOS+.COM
This can be copied by using PIP.

To copy RAMDOS+.COM onto a Start of Day disc:

```
If drive B is connected, do NOT put a disc In It.
Put CP/M Plus System Disc In drive A. with Side 1 uppermost
Type:   |CPM    [Enter]
        PIP A:=B:RAMDOS+.COM  [Enter]
Put the RAMDOS disc in drive A        when prompted for the 'Disc for B'
Put your Start of Day disc In drive A when prompted for the 'Disc for A'
```

The command 'RAMDOS+ D20; can be put In a PROFILE.SUB file on your start of day disc so that it is called whenever CP/M Is initialised. See your manual or the Help file on your CP/M Plus disc.

Technical details:

RAMDOS+ changes the DPB values and adds a patch to CPM In bank 0. None of the addresses of the DPBs, CHKs, ALVs etc are changed.

When 'RAMDOS+ O' is entered you are prompted for the drive whose Disc Parameter Block you wish to review. The DPB and XDPB values will be displayed one by one, and can be changed by ENTERing a new value (In decimal or In hex proceeded by '&' or left unchanged by pressing ENTER.

WARNING: Experimentation with these values is not recommended. Setting these values wrongly can seriously damage the health of your disc drive.

Patching a CP/M Plus Disc:

The following instructions show how to reconfigure the CP/M Plus on your Start of Day Disc so that it can access Drive B without using RAMDOS+.COM. Do not reconfigure your original System Disc.

Reset your computer by pressing CTRL-SHIFT-ESC simultaneously.
Put your copy of the CPM Master Disc in Drive A, with Side A uppermost.

Type in the following commands which are underlined, and follow the instructions in square brackets. The other words are the responses made by the computer.

Technical details:

This patch enables CP/M Plus to recognise a 5.25in drive B.
It can only be used on CP/M Plus on the CPC, and not on CP/M 2.2 or CP/M Plus on the PCW.

The DPB values are the ones poked into &5A5-&5BF. The values recorded above are for the D20 format. If you wish to use a different default format, use the following values:

```
D1:      24 00 04 OF 00 67 01 7F 00 CO 00 20 00 00 00 02 03 01 50 09 01 00 02 2A 52 60 FF
D10:     28 00 04 OF 00 SF 01 7F 00 CO 00 20 00 00 00 02 03 01 30 OA 11 00 02 09 10 60 FF
D21:     24 00 04 OF 00 67 01 FF 00 FO 00 20 00 00 00 02 03 01 50 09 21 00 02 2A 52 60 FF
D20:     28 00 04 OF 00 SF 01 FF 00 FO 00 20 00 00 00 02 03 01 50 OA 31 00 02 09 10 60 FF
```

```
|CPM
[Turn the disc over,so that side B is uppermost. Press any key.]
A>SAVE                  [Enter]
A>SID C10CPM3.EMS       [Enter]
CP/M 3 SID - version 3.0
?
#G100  [Put the disc to be reconfigured in drive A and press Enter.]
CP/M 3 SID - Version 3.0
NEXT MSZE PC END
6500 6500 0100 D2FF
#S1087                  [Enter]
1087 32 C3              [Enter]
1088 DD E2              [Enter]
1089 B0 0E              [Enter]
108A C9 X               [Enter]
?
#S10A2                  [Enter]
10A2 FF 32              [Enter]
10A3 FF DD              [Enter]
10A4 FF B0              [Enter]
[Continue typing the following numbers, pressing Enter after each.]

21   E5   03   11   7F   FF   01   1B   00   ED   B0   C9

10B1 FF  X              [Enter]
?
#S5A5                   [Enter]
05a5 FF 28              [Enter]
05A6 FF 00              [Enter]
05A7 FF 04              [Enter]

[Continue typing the following numbers, pressing Enter after each.]

0F   00   8F   01   FF   00   F0   00   20   00   00   00
02   03   01   50   0A   31   00   02   09   10   60   FF

05C0 32 X               [Enter]
?
#SF1A                   [Enter]
0F1A 79 CD              [Enter]
0F1B F6 F8              [Enter]
0F1C 20 01              [Enter]
0F1D 23 X               [Enter]
?
#S3B8                   [Enter]
03b8 FF 79              [Enter]
03B9 FF E6              [Enter]
03BA FF 03              [Enter]
03BB FF F6              [Enter]
03BC FF 20              [Enter]
03BD FF C9              [Enter]
03BE FF X               [Enter]
?
#       [Press CTRL & C together]
CP/M 3 SAVE - Version 3.0
Enter file (type RETURN to Exit): C10CPM3.EMS       [Enter]
Delete C10CPM3.EMS? Y                               [Enter]
Beginning hex address 100                           [Enter]
Ending hex address    6500                          [Enter]
```

```
A>
[The disc is now reconfigured.)
```

RAMDOS with TASWORD 6128

```
RUN "TASWORD"
- go into Basic then:
RUN "RAMDOST"
```

RAMDOST loads RAMDOS.BIN into the text area which is reduced by 2K to about 62K.

If Qualitas is being used, then run Qualitas first, return to Basic and run RAMDOST.

Start of day disc:

Files needed are: RAMDOST.BAS, and RAMDOS.BIN
The Basic program is unprotected and can be loaded and saved as normal.
The Binary program can be loaded by:

```
MEMORY &2FFF:LOAD "RAMDOS.BIN",&3000
```

and saved by:

```
SAVE "RAMDOS.BIN",b,&3000,&E00
```

Technical details:

RAMDOST loads RAMDOS.BIN into the top of bank 7, which is the top of the text area in Tasword 6128. The text area available in Tasword is reduced so that it is not possible to over- write RAMDOS by filling the text space.

Qualitas also loads part of Its program into bank 7, but it cannot be relocated, so Qualitas must be run first. RAMDOST will then relocate RAMDOS below Qualitas. Qualitas further reduces the text area available.

The 2K buffer area is not changed by RAMDOST, because TASWORD sets a new permanent buffer of its own.

KDS DISC ROM

When drive B is connected, it must be turned on BEFORE the computer.

The Rom plugs into any standard rom board in any position below number 7. HIMEM is not altered and all Basic commands, BIOS calls, and CP/M commands work as normal. The IBM format in drive A Is replaced by the PCW format. Four new formats are automatically recognised for drive B:

```
D1    Data    disc with 128 directory entries. 718K
D10   Data    disc with 128 directory entries. 798K
D2    Data    disc with 256 directory entries. 716K
D20   Data    disc with 256 directory entries. 796K
```

Discs can be formatted using FORMATS. Discs formatted by other programs may not be recognised correctly.

CP/M Plus is installed as normal, but the .EMS file needs to be patched, as described below. Note that a disc must be In drive B when |CPM Is called in order for drive B to be logged in.

Discs for drive B cannot be formatted with FORMAT.COM or DISCKIT3 because these programs assume that drive B 's identical to drive A. Some other programs cannot be used, either because they assume that drive A is the same as drive B (such as COPYDISC or CHKDISC), or because they are written for only one drive (such as FILECOPY, DISCCOPY or DISCCHK).

Technical details:

The KDS Disc Rom replaces the action of Rom 7, leaving all the memory above HIMEM exactly as normal except:
- the ALV of drive B is now at &BE00, with room for 800K
- the CKS of drive B is now at &BEC0,with room for 256 directory entries

The different formats are recognised by their sector numbers:

```
Drive A:       System = &41   Drive B:       D1     = &01
               Data   = &Cl                  D10    = &11
               Pcw    = &0l                  D2     = &21
                                             D20    = &31
```